Benisang village (Middle Khwaja Omari)

Two varieties i.e. Pamir-94 and Kalak were replicated with 4 farmers who contributed average plot size of 2134 m² for wheat date of planting OFT in Benisang village.

One-year data shows optimum date 27 September or 1st date of planting in Benisang and surrounding villages. Pamir-94 improved and Kalak local varieties produced high yield in this date each 5.933 tons/ha. and 6.017 tons/ha respectively.

Grain yield of Pamir-94 increased in 27 September date of planting (1st date) 4%, 27% and local variety in the same date produced 8%, 25% more grain yield against 2nd and 3rd dates of planting.

Since there was no rust incidence during 1998/99 growing season, Kalak local variety has shown tolerance to cold weather and produced 1% more yields than Pamir-94 improved variety.

The analysis shows that improved variety grain yield decrease 17-42 kg/ha./day and local variety 29-39% in late planting than optimum date or 27 September
When the results were discussed with the farmers, one-year data was not acceptable to the farmers. Therefore it was decided to repeat the trial for two more years to get reliable data regarding proper date of planting for wheat in the area (Table 11, Annex-1)

Noburja village (Lower Khwaja Omari)

In this village 4 farmers conducted wheat date of planting On Farm Trial with plot size of 2025 m². Improved variety of Pamir-94 and local variety of Kalak was included in the trial..

Average yields of two variety shows that local variety produced 3% more yield than improved variety, because of the local variety's tolerant character to frost and winter kill and no rust disease incidence during 1998/99, crop season.

Pamir-94 in 3rd date of planting (27 October) produced 1%, 5% more grain yield than 12 October and 27 September dates of planting (1st & 2nd dates). While grain yield of local variety in 1st date of planting (27 September) is increased 3%, 29% against 12 October and 27 October dates of planting or 2nd & 3rd dates of planting

When the results were discussed with the farmers they agreed that in last week of October the slightly increased and for further evaluation it was decided that this OFT should be repeated for two more years (Table12, Annex-1)

7 Seed Rate On Farm Trials

Method

Since OFTs are a participatory research program with farmers, therefore two seed rates has been chosen for the trial i.e. IAD recommendation which is recommended by FAO and normal seed rate that farmers use or farmer practice.

Pamir-94 improved variety was included in the trial. Other factors are the same and all farmers involved in the trial have used the same normal practices through the season. The land was divided into two equal sizes, one plot for farmer seed rate and other plot as experimental plot for comparison with farmer practice.

According to the agronomist advice at harvesting time the farmer has harvested of each plot (experimental plot and comparison plot) separately, then he has threshed separately and agronomist had recorded grain yield and by-product of each plots.

7.1 Khwaja Omari

In 1998/99, crop season in seed rate OFT only Pamir-94 improved variety, which is under multiplication in the project area included in the trial, because the community interested to find out standard seed rate of this variety. Two seed rates or treatments were chosen. This decision has been taken only on the basis of farmer's practice and FAO recommendation. i.e. 56 kg/Jerib that is usual seed rate used by the farmers, and 42 kg/Jerib IAD recommendation. Seed rate OFT was replicated in randomized design with 12 farmers in 3 villages. The OFT was planted from 13-15 November 1998 and harvested in 15 October 1999. Average plots size was 1518 m^2. Fertilizer rate was urea 42 kg and DAP 26 kg/Jerib and the weeds were mechanically controlled by the farmers

Results and Discussion

Over all means of one-year data of 12 replications in Khwaja Omari district shows slight increase in 1st treatment (42 kg/Jerib seed rate recommended by IAD) in grain yield as well as by-product compare to farmers' practice. Considering village-wise data where the OFT was planted shows different results as below.

Seed rate recommended by IAD (42 kg/Jerib), grain yield and by-product is increased 8% in Deh Nehal and 5% in Deh Dawlat. While in Chel Gunbad village due to higher altitude same treatment (IAD recommendation) shows 7% decrease in grain yield as well as by-product than farmer practice

When the farmers discussed their results they agreed that low seed rate recommended by DACAAR produced more yield compare to their own practice. At the end it was decided that for further evaluation this OFT should be repeated next season. (Table 13-16, Annex-II)

7.2 Jaji

Seed rate is one of the main limiting factors in this area. Two seed rate was selected, 35 kg/Jerib (IAD recommendation) and 44 kg/Jerib (Farmers' practice)

The trial was replicated with 4 farmers as randomized design in average plot size of 1396 m². Normal planting date in Sargal is from 15-30 September. Since the farmers were busy in potato fields, the OFT was planted from 9-19 October 1998, and harvested from 17-22 July 1999. Fertilizer rate was DAP 25 kg and urea 40 kg/Jerib. The trial had been planted late in dry soil condition and all other practices were the same except two different seed rates.

Results and Discussion

In farmer practice seed rate, 40 kg/ Jerib the yield is increased by 2% than IAD recommendation. It approves that low seed rate damage by winterkill because of high altitude and cold winter in Jaji IAD project area

Through discussing results of seed rate OFT in a VO meeting the farmers who had conducted this OFT commented that though there is small increase in yield in improved practice or seed rate recommended by DACAAR. By using seed rate recommended by DACAAR at least they can save some seed compare to old practice. They explained that using high seed rate cause dense plant population having weak stems and produces small heads, which produce low yield. It was decided that the OFT should be repeated for 2nd year for better comparison of two different seed rates (Table 17 Annex II)

8 Irrigation On Farm Trials

Method

Amount of irrigation and particularly time of application is a limiting factor for wheat production in Afghanistan particularly in IAD project areas.

This variable had proposed by the communities in a VO meeting. Also water right is by turn, the farmers irrigate their fields when water is available regardless of the need of the plant.

For this OFT, two methods of irrigation were considered i.e. IAD scheduling and farmer practice. In IAD scheduling the four critical stages of wheat growth has been considered as follows

- 21 days after planting or crown root stage.
- Tillering stage
- Flowering/heading stage
- Milking stage

8.1 Khost

During 1997/98-crop season, irrigation OFT was designed by the agronomist with the help of some experienced farmers in Khost Project. Kauz variety was selected for the trial and it was replicated with 6 farmers in average plots of 2000 m². This OFT was planted in 3 November 1998 and harvested in 21-27 May 1998. Seed rate was 35 kg/Jerib and two irrigation timing (treatments) were chosen e.g. IAD scheduling (crown root formation, tillering, flowering/heading and milking stage) and the farmer practice.

On the basis of IAD scheduling, the plots were irrigated four times.

- 7 December 1997
- 10 March 1998
- 12 April 1998
- and 25 April 1998

Results and Discussion

Average yields of two treatments show clear variation and yield is increased by 15% in 1st treatment recommended by IAD against farmer practice.
For the next season the farmers did not continue with the program, because of unavailability of irrigation water in due times and this OFT was cancelled (Table 18 Annex-III)

8.2 Gardez

For the 1998/99, crop season, wheat irrigation OFT was designed by the farmers and agronomist. Pamir-94 variety was selected to be included in this On Farm Trial. The trial was replicated in randomized design with 3 farmers who contributed with average plots of 2000 m². Two replication of the trial had been planted in 14-18 November 98, while the 3rd replication planted in 27 March 99, because of snowfall started in November, and the 3rd farmer could not plant his plot on right time. The trial was harvested from 16-27 July 1999. Fertilizer rates were urea 40 kg and DAP 25 kg/Jerib and seed rate 35 kg/Jerib was used.

On the basis of IAD scheduling, the plots were irrigated on 6 May 99, 29 May 99, 17 June 99 and 4 July 99.

Results and Discussion

Since the trial has not been implemented properly, therefore the figures on average yield in two treatments are not reliable.
Considering above explanation irrigation OFT is not applicable under farmer's condition and this OFT was cancelled (Table 19. Annex-III)

8.3 Jaji

The OFT was replicated with 4 farmers as randomized design in average plot of 1792 m². Pamir-94 wheat variety which is under multiplication with seed growers in Jaji IAD project area, was planted from 9-20 September 98 in dry soil and harvested from 16-21 July 99. Fertilizer rate was DAP 25 kg, urea 40 kg and seed rate 35 kg/Jerib. Leaf blotch disease is recorded 3% on plots. Two irrigation timing had been chosen as treatments (IAD scheduling and farmer practice). IAD scheduling for irrigation is as follows.

- Crown root formation (30 October 98)
- 10-20 November 98, to cover soil crust (special case)
- Tillering stage (29 April-19 May)
- Heading/flowering stage (19 May-4 June)
- Milking stage(8-20 June)

Results and Discussion

Since water right is by turn, the farmers could not follow IAD scheduling. Due to this problem this OFT was cancelled.

9 Fertilizer On Farm Trials

Method

The communities in a VO meeting have mentioned fertilizer application as a limiting factor. In order to find out the standard rate of fertilizer to be applied in wheat fields, two rate of fertilizer were chosen for comparison i.e. IAD recommendation and normal fertilizer rate used by the farmers. All other practices are the same and uniform. These two treatments have been used on side by side plots, in one plot fertilizer rate normally used by farmer and in the next plot amount of fertilizer recommended by IAD has been used.

9.1 Alingar

In 1998/99 crop season in Salab the community had proposed fertilizer rate as a limiting factor in a VO meeting. The agronomist agreed with the community and chose two rate of fertilizer for the OFT e.g. urea 50 kg/Jerib, DAP 50 kg/Jerib (farmers practice) and urea 37.5 kg/Jerib, DAP 28 kg/Jerib (IAD recommendation).

Pamir-94 variety was selected for the trial and 6 farmers were contributed in 3 replications in a randomized design with average plot size of 575 m². Tractor was used for land preparation. The trial was planted from 12-21 November 98, which is normal farmer practice and harvested in 1 June 99. The land was prepared by tractor and seed rate was 28 kg/Jerib. The farmers conducted roguing and mechanical weed control on their plots.

Results and Discussion

IAD's recommended fertilizer rate appears to increase production (average 20%) by-product however is 5% less on average with the IAD recommended fertilizer application. However two years data of wheat fertilizer trial in Laghman by FAO (DAP 38 kg, urea 35 kg/Jerib) produced high yield.

Lower yield in farmer practice is due to the higher dose of fertilizer cause lodging of standing wheat, which caused yield reduction.

When the farmers discussed these results they found that the rate of fertilizer recommended by DACAAR produced more yield compare to their own practice. They decided to use this rate of fertilizer in wheat cultivation onward. Even the farmers were approached to DACAAR extension workers and requested to measure their lands and advise them the amount of fertilizer required for their specific land. It was decided to repeat this OFT in order to get reliable result and find out proper amount of fertilizer per Jerib (Table 19, Annex-IV)

9.2 Jaji

In Jaji project area the farmers are using only urea on wheat crop, but DAP which is necessary for grain formation and high yield production is not considered.

In 1998/99 crop season the matter was discussed in a VO meeting and the community interested to conduct an OFT on fertilizer application in order to find out the right amount of fertilizer. Pamir-94 variety was included in the trial and it was replicated in randomized design with 4 farmers in average plots of 1792 m^2, out of which one replication was discorded because of poor germination. The OFT was planted in 14-19 October 1998 and harvested in 16-19 July 1999. Seed rate was 35-kg/Jerib and leaf blotch is recorded 3% in all plots.

Two rate of fertilizer e.g. urea 40 kg/Jerib, DAP 25 kg/Jerib (IAD recommendation) and urea 50 kg/Jerib, DAP 0 (farmer practice) have been used by the farmers.

Results and Discussion

One-year data of fertilizer OFT in Sargal village shows a clear variation in yield production of two different fertilizer rates or treatments. Average yield shows in both grain and by-product 30% increase in treatment that is recommended by IAD. It proves that DAP is an essential element in grain formation and increasing yield. But there is no fertilizer recommendation by FAO or other agencies for Paktia province.

When the farmers discussed the results of the OFT they decided to use total amount of DAP and half of urea at planting time and rest of urea in the spring. It was also decided by the VO meeting to repeat this OFT for the second year for further evaluation (Table20, Annex-IV).

10 Weed Control On Farm Trial

10.1 Jaji

Method

One of the factors that cause yield reduction is unwanted plants or weeds in wheat fields, the weeds compete with main crop for water, micro elements, sunlight and is as a shelter for pests and diseases, the farmers know it as a limiting factor. Most of the farmers in Afghanistan mechanically collect weeds from the field and feed their animals.

Weed are a serious problem all over the country, particularly in Jaji and this was proposed by the community in a VO meeting to conduct an OFT to find out the effective methods of weed control in order to increase wheat production

.

During 1998/99 crop season an OFT on weed control was designed in a way that only two method of control i.e. mechanical and chemical control. In chemical control 2-4-D herbicide @ 400 grams/Jerib before jointing stage in the spring only one spray was recommended by IAD. Mechanical control, which is farmers' practice, 2 times through the season, was implemented.

Pamir-94 wheat variety was used in the trial and it was replicated as randomized design with 4 farmers, where average plot size was 2490 m². Fertilizer rate used 25 kg DAP and 40-kg urea and the seed rate was 35 kg/Jerib.

Results and Discussion

Average yield of one-year data reveals that by chemical control measure the yield is increased only 1% (Table 23, Annex-V)

Due to cold weather in the springtime in Jaji, herbicide did not effect on weeds satisfactorily.
Farmers collect weeds from wheat plots and feed their animals
Considering above reasons weed OFT was cancelled (Table 21, Annex-V)

11 Test of variety On Farm Trial

Method

In order to have a back up varieties in the project areas, wheat varieties, which are under release or already released, by FAO were planted in farmers field for test. The aim and

objective of variety test is to find out the higher yielding and well-adapted variety(s) in the area.

During 1998/99 planting season new varieties of wheat seed received from FAO for testing in IAD project areas. It was also discussed in VO meetings and the communities were agreed to test new varieties of wheat in their areas. In test of variety OFT variable is the variety. Seed rate, urea and DAP were used on the base of IAD recommendation in order to compare the average yield of different varieties under control conditions. The test plots in the project areas are as follows.

11.1 Khwaja Omari

In Khwaja Omari district of Ghazni two improved varieties were tested.

- Gul-96 variety planted in 24 September in Qalua-e- Qurban village in. 1998 in a farmer's field of 1200 m². The test plot was harvested in 14 July 1999

- Kauz variety was planted in 2716 m² in Benisang village with other farmer in the spring, 14 March 99, because this variety is for warm area and harvested in 25 July 99.
  For both varieties seed rate was 42 kg , urea 42 kg and DAP 25 kg per Jerib. Total DAP and 1/3 of urea used at planting time and 2/3 in the spring. Growth period for Gul-96 is 270 days and Kauz is 133 days.

Results and Discussion

Gul-96 variety is rust resistant, has amber grain color and good baking quality. Farmers are interested to grow Gul-96. Yield recorded in kg/ha. from the test plots is as follows:

Variety	Grain yield	By-product.
Gul-96	5025	8533
Kauz	2695	4043

When the results were discussed by the farmers they decided that Gul-96 because of its amber color, baking quality and high yield potential was the variety they wanted to adopt and it was decided therefore to use this variety in the seed multiplication programme in 1999/2000 (Table 22, Annex-VI)

11.2 Laghman

Four varieties i.e. Takhar-96, Roshan-96, Kauz and Pamir-94 were introduced by FAO to be tested in Alingar IAD project area.

These four varieties were planted in Mehterlam and Salab valley in farmer's field in average area of 1077 m². The test plots were planted from 15-26 November 1998 and

harvested from 3-25 May 1999. Urea 37.5 kg DAP 28 kg and seed rate 28 kg/Jerib was used in the test plots. For weed control 2 kg/ha. 2-4-D herbicide was applied before jointing stage (only one spray). The plots were irrigated 6 times except Pamir-94, which was irrigated 7 times. Powdery mildew is recorded 5% on Takhar and Kauz varieties and lodging 30% on Takhar and 10% on Roshan varieties. On Roshan variety which is a bake up for Pamir-94 in Alingar, strip rust disease is recorded 10MR.

Results and Discussion

Average yield (tons/ha) of Takhar-96 in Lower Salab is recorded 4.89 in Upper Salab is 4.96 and in Mehterlam is 4.09.

Roshan-96 produced 5.0 tons, 5.3 tons and 5.37 tons per ha. in Lower Salab, Upper Salab and Mehterlam respectively.

Kauz variety yield is recorded as an average of two farmers' plots 6 t/ha in upper Salab, and in Lower Salab its yield is 5.6 t/ha.

Pamir-94 was planted only in Lower Salab, and its yield is recorded 5.6 t/ha

The farmers complained about the poor baking quality of Pamir-94. They decided that they preferred Roshan-96, which will therefore be used for the multiplication programme in 1999/2000. The farmers prefer Roshan-96 because of its high yield, desirable grain color and baking quality (Table 23, Annex-VI)

11.3 Jaji

In 1998/99 six varieties of wheat were planted for testing under cold climatic condition and high altitude in Sargal village of Jaji. Through VO meeting 6 interested farmers were selected who contributed in average plot size of 550-m² land. The test plots were planted from 18-23 November 98 and harvested in 15-20 July 1999. Seed rate 35 kg, urea 40 kg and DAP 25 kg /Jerib (IAD recommendation) was used in the test plots. The plots were irrigated 5 times during crop growing season. The varieties/lines included for test are as follows

- Rana-96
- K2340/SK/MA/G2/3/K340/FR14/14...,
- F134-7/CRWS
- VEE#7/OPATA
- Gul-96
- ENZA/KARTAYA.

Results and Discussion

Average yield of varieties shows clear variation. Rana-96 has shown good performance under cold climatic condition of Jaji IAD project and produced 4.404 t/ha. under farmer conditions, it produced 24%, 39%, 69%, 100% and 69% more grain yield than varieties No.2, 3, 4, 5, 6 respectively.

Rana-96 variety due to amber color and good baking quality is acceptable to the farmers and they are interested to grow Rana-96. IAD considering community interest has included Rana-96 in 1999/2000-crop season in multiplication program with some contract seed growers (Table 24, Annex-VI)

1 Introduction

Agriculture is clearly one of the principle needs for durable refugee repatriation and locally sustainable economic recovery. The vast majority of the Afghan people depend on agriculture for their subsistence and income, as Afghanistan is a rural country, where more than 80% of the population are engaged in agricultural and pastoral activities. Agricultural research and extension form the basis of a functioning agricultural production system. Since 1978 conflicts and serious social and political disruption have severely affected both services and, as a result, the country's agricultural production.

Farmer-based Research and Technology Development: When starting work with a VO, IAD agronomists_first interact with the farmers to learn from them their problems and to understand their decision-making processes with regard to their farming systems. On the basis of this, it is possible to assess the potential for improving various aspects of the farming system (new crops, improved varieties, improved farming practices, better marketing etc.). On the basis of this kind of analysis, but encouraging farmers themselves to identify and select improvements, DACAAR proceeds with identifying, testing, evaluating and disseminating new agricultural technologies, using participatory approaches. One example of this is the On Farm Trial (OFT) where the farmers, through the VO and the agronomist identify what they see as limiting factors in agricultural production, then design and implement experiments or trials in order to evaluate the suggested solutions to these limiting factors. These OFTs are implemented on the farmers' own land using their usual agricultural practices in order to ensure that the results are appropriate to the local situation.

Various techniques are used to involve all farmers in following these OFTs. These include farmer field day, VO discussions and small group discussion with farmers. In addition, once results have been gathered and analyzed they are discussed with the farmers who then decide whether to adopt the innovations. To do further trials etc. This process involves extension services, which focus on:

Supporting the farmers in their search for the improved technologies, seed and varieties which will improve their farming systems

Providing technical back up to farmers, if required through referring specific problems to agencies with the requisite skill to provide advice.

2 Agroclimatic Zones of the Project Areas

2.1 Eastern Zone

This zone includes the provinces of Nangrahar, Laghman, Kunar and Paktia. The elevation ranges from 430-2000 (masl). The average annual precipitation is about 172 mm. The climate is sub tropical, hot humid summers and mild winters. The mean maximum temperature is 40°C and the mean minimum temperature is 2°C. On average the first frost occurs in autumn on December 4, and the mean date last day of frost is on January 22 with a total of 315 frost-free days. The major crops grown in this zone are cereals (wheat, maize, barley and rice), vegetables, citrus and sugarcane.

12 Annex - I

Wheat Date of Planting On-Farm Trial Data 1997-98 & 1998/99
(Tables 1-12)

Table 1 Average Yield t/ha, Wheat Date of Planting OFT, Kandahar 1997/98

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
Pamir-94	T1	3.97	4.75	6.18	5.12	20.02	5.00
	T2	4.60	3.61	4.25	4.80	17.26	4.32
	T3	5.16	4.02	3.89	4.16	17.23	4.31
	T4	4.99	4.10	4.40	3.76	17.25	4.31
Total		***18.7***	***16.5***	***18.7***	***17.8***	***71.8***	***4.48***
Kauz	T1	3.97	6.72	4.52	5.76	20.97	5.24
	T2	2.67	4.75	3.65	4.72	15.79	3.95
	T3	5.55	4.51	4.20	5.44	19.70	4.93
	T4	4.76	5.10	4.84	4.16	18.86	4.72
Total		***16.95***	***21.08***	***17.21***	***20.08***	***75.32***	***4.71***
Mauri	T1	1.51	2.21	1.90	2.16	7.78	1.95
	T2	2.20	2.05	2.06	1.84	8.15	2.04
	T3	1.67	1.72	1.67	1.84	6.90	1.73
	T4	2.54	1.56	1.51	1.44	7.05	1.76
Total		***7.92***	***7.54***	***7.14***	***7.28***	***29.88***	***1.87***
Mexipak	T1	3.89	3.69	3.80	4.00	15.38	3.85
	T2	4.92	4.34	4.24	5.44	18.94	4.74
	T3	6.11	3.85	4.92	4.80	19.68	4.92
	T4	7.46	6.30	5.00	4.64	23.40	5.85
Total		***22.38***	***18.18***	***17.96***	***18.88***	***77.40***	***4.84***

No. of variety 4 (2 local and 2 improved)
No. of treatments 4 dates of planting

- 15 November
- 30 November
- 15 December
- 30 December

No. of replications 4 farmer fields
Average plot size 2023 m²

Table 2 Average Yield t/ha, Wheat Date of Planting OFT, Gardez 1997/98

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*Total*	*Means*
Ataya-85(improved)	T1	3.60	3.40	2.20	9.20	3.07
	T2	2.20	1.70	2.00	5.90	1.97
	T3	2.00	1.40	2.80	6.20	2.07
	T4	2.60	2.10	3.20	7.90	2.63
Total		***10***	***9***	***10***	***29***	***2.43***
Pamir-94 (improved)	T1	3.60	5.20	3.00	11.80	3.93
	T2	2.00	1.20	2.20	5.40	1.80
	T3	2.60	1.40	4.60	8.60	2.87
	T4	3.20	2.60	3.80	9.60	3.20
Total		***11.40***	***10.40***	***13.6***	***35.40***	***2.95***
Safedcha (local)	T1	1.40	1.40	1.00	3.80	1.27
	T2	1.40	0.60	0.80	2.80	0.93
	T3	0.80	1.60	1.20	3.60	1.20
	T4	0.80	0.60	1.00	2.40	0.80
Total		***4.4***	***4.2***	***4.0***	***12.6***	***1.05***
Surkha (local)	T1	1.80	1.20	0.60	3.60	1.20
	T2	1.00	0.40	0.60	2.00	0.67
	T3	0.70	0.40	1.60	2.70	0.90
	T4	0.80	0.70	0.60	2.10	0.70
Total		***4.3***	***2.7***	***3.4***	***10.4***	***0.87***
Kundi (local)	T1	1.60	1.40	1.00	4.00	1.33
	T2	1.00	0.40	0.80	2.20	0.73
	T3	1.10	0.60	1.40	3.10	1.03
	T4	0.80	0.30	1.00	2.10	0.70
Total		***4.5***	***2.7***	***4.2***	***11.4***	***0.95***

No. of variety 5 (2 improved, 3 local)
No. of treatments 4 dates of planting

- 15 October
- 30 October
- 15 November
- 30 November

No. of replication 3 farmer fields
Average plot size 1667 m²

Table 3 Average Yield t/ha, Wheat Date of Planting OFT, Gardez 1998/99

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*Total*	*Means*
Ataya-85(improved)	T1	5.20	5.40	4.60	15.20	5.07
	T2	3.60	5.40	5.40	14.40	4.80
	T3	3.00	5.00	3.60	11.60	3.87
	T4	4.40	2.60	3.00	10.00	3.33
Total		***16***	***18***	***17***	***51***	***4.27***
Pamir-94 (improved)	T1	4.40	5.40	4.00	13.80	4.60
	T2	5.20	4.20	4.20	13.60	4.53
	T3	4.60	3.00	4.00	11.60	3.87
	T4	3.40	3.40	4.40	11.20	3.73
Total		***17.60***	***16.00***	***16.60***	***50.20***	***4.18***
Safedcha (local)	T1	4.00	5.00	3.20	12.20	4.07
	T2	4.20	4.60	4.80	13.60	4.53
	T3	3.60	5.00	3.60	12.20	4.07
	T4	3.00	5.00	3.00	11.00	3.67
Total		***10.8***	***14.6***	***11.4***	***49.0***	***4.1***
Surkha (local)	T1	5.40	4.40	3.40	13.20	4.40
	T2	5.20	6.00	3.80	15.00	5.00
	T3	4.00	6.00	3.00	13.00	4.33
	T4	3.20	2.80	3.20	9.20	3.07
Total		***17.8***	***19.2***	***13.4***	***50.4***	***4.20***
Mauri (local)	T1	4.80	4.20	3.20	12.20	4.07
	T2	3.60	5.20	4.00	12.80	4.27
	T3	3.00	3.40	3.40	9.80	3.27
	T4	3.00	4.20	2.60	9.80	3.27
Total		***14.4***	***17.0***	***13.2***	***44.6***	***3.72***

No. of variety   5 (2 improved, 3 local)
No. of treatments   4 dates of planting

- 15 October
- 30 October
- 15 November
- 30 November

No. of replication   3 farmer fields
Average plot size   1667 m²

Table 4 Average Yield t/ha, Wheat Date of Planting OFT, Khost 1997/98

varieties	*Trea.*	*RI*	*RII*	*RIII*	*RIV*	*RV*	*Total*	*Mean*
Kauz	T1	2.33	2.57	3.3	2.5	2.57	13.27	4.84
	T2	3.1	2.87	2.8	2.8	2.8	14.4	5.14
	T3	2.37	2.53	3.13	2.4	2.6	12.97	4.71
Total		***7.8***	***7.97***	***9.23***	***7.67***	***7.97***	***40.64***	***4.9***
Inqilab-92	T1	2.1	1.87	2.9	1.9	2.27	11.04	4.00
	T2	2.3	2.17	3.5	2.1	3	12.67	4.61
	T3	2.37	2.53	3.1	2.4	3	12.97	4.71
Total		***6.77***	***6.57***	***9.53***	***6.37***	***7.44***	***36.68***	***4.4***

No. of variety 2 (improved
No. of treatments 3 dates of planting

- 01 November
- 15 November
- 01 December

No. of replications 5 farmer fields
Average plot size 2000 m^2

Table 5 Average Yield t/ha, Wheat Date of Planting OFT, Khost 1998/99

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*RV*	*RVI*	*Total*	*Mean*
Kauz	T1	4.9	2.9	7	4.3	3	5.17	27.27	4.55
	T2	5.6	2.9	6.3	5.1	4.2	5.1	29.2	4.87
	T3	3.5	2.8	7	3	2.8	3	22.1	3.68
Total		***14***	***8.6***	***20.3***	***12.4***	***10***	***13.27***	***78.57***	***4.37***
Inqilab-91	T1	3.5	2.8	4.3	3.8	2.8	2.4	19.6	3.27
	T2	5.7	2.8	3.8	4.6	4.3	4.1	25.3	4.22
	T3	3.08	2.6	5.8	3.6	3.6	4.6	23.28	3.88
Total		***12.28***	***8.2***	***13.9***	***12***	***10.7***	***11.1***	***68.18***	***3.79***

No. of variety — 2 (improved)
No. of treatments — 3 dates of planting

- 01 November
- 15 November
- 01 December

No. of replications — 5 farmer fields
Average plot size — 2000 m^2

Table 6 Average Yield t/ha, Wheat Date of Planting OFT, Salab 1997/98

Treat.	*RI*	*RII*	*RIII*	*RIV*	*Means*
		Grain			
T1	4.07	4.33	4.32	3.33	4.01
T2	4.77	4.53	4.53	4.33	4.54
		By-product			
T1	7.60	7.34	6.83	6.67	7.11
T2	5.67	7.69	7.36	6.95	6.92

Variety Zardana (improved)
Treatments 2 dates of planting

- 06 November (this date was missed)
- 22 November
- 06 October

No. of replications 4 farmer fields
Average plot size 2165 m²

Table 7 Average Yield t/ha, Wheat Date of Planting OFT, Lower Salab 1998/99

Treatments	*Main*			*Total*	*Mean*
	RI	RII	RIII		
T1	5.00	6.19	6.90	18.09	6.03
T2	4.85	5.20	6.38	16.43	5.48
T3	4.53	5.15	5.24	14.92	4.97
Total	***14.38***	***16.54***	***18.52***	***49.44***	***5.49***
	By- Product				
T1	6.80	8.63	7.40	22.83	7.61
T2	6.14	8.39	7.80	22.33	7.44
T3	6.47	8.07	6.25	20.79	6.93
Total	***19.41***	***25.09***	***21.45***	***65.95***	***7.33***

No. of variety — 1 improved variety (Kauz)
No. of treatments — 3 dates of planting

- 09 November
- 19 November
- 29 November

No Of replications — 3 farmer fields
Plot size — 1143 m²

Table 8 Average Yield t/ha, Wheat Date of Planting OFT, Upper Salab 1998/99

Treatments	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
			Main			
T1	6.1	3.3	5.8	3	18.2	4.55
T2	5.36	6	5.87	3.63	20.86	5.22
T3	4.8	2.88	4.27	4.33	16.28	4.07
Total	***16.26***	***12.18***	***15.94***	***10.96***	***55.34***	***4.61***
			By- Product			
T1	7.30	8.34	7.80	9.20	32.64	8.16
T2	10.00	10.00	8.39	8.38	36.77	9.19
T3	9.00	10.00	6.79	9.04	34.83	8.71
Total	***26.30***	***28.34***	***22.98***	***26.62***	***104.24***	***8.69***

No. of variety 1 improved variety (Kauz)
No. of treatments 3 dates of planting

- 09 November
- 19 November
- 29 November

No Of replications 3 (12 farmer fields)
Plot size 196 m²

Table 9 Average Yield t/ha, Wheat Date of Planting OFT, Khwaja Omari 1998/99

Variety	*Treat*	*RI*	*RII*	*RIII*	*RIV*	*RV*	*RVI*	*RVII*	*RVIII*	*RIX*	*RX*	*RXI*	*RXII*	*Mean*
							Main							
Local	T1	3.654	3.642	3.245	4.349	5.234	6.550	7.740	4.545	5.294	3.262	3.887	3.555	4.580
	T2	4.741	2.935	4.106	3.488	5.511	4.842	6.802	5.142	4.745	4.201	3.229	3.313	4.421
	T3	4.480	2.444	4.435	3.430	3.789	5.917	5.208	4.408	4.071	3.311	3.241	1.751	3.874
Total		***12.875***	***9.021***	***11.786***	***11.267***	***14.534***	***17.309***	***19.75***	***14.095***	***14.11***	***10.774***	***10.357***	***8.619***	***4.292***
							By- Product							
	T1	7.308	9.104	8.245	8.699	13.085	16.375	15.48	11.363	12.353	6.924	9.42	8.397	10.563
	T2	9.481	7.337	10.264	6.977	13.777	12.104	13.605	12.855	11.062	9.243	8.07	7.087	10.155
	T3	8.960	6.111	11.087	6.859	9.472	14.792	10.417	11.019	7.561	8.400	8.102	3.253	8.836
Total		***25.749***	***22.552***	***29.596***	***22.535***	***36.334***	***43.271***	***39.502***	***35.237***	***30.976***	***24.567***	***25.591***	***18.737***	***9.851***
Pamir-94							Main							
	T1	6.462	3.006	2.450	5.130	7.368	4.900	3.874	7.589	6.353	3.475	2.00	2.416	4.585
	T2	5.211	4.150	4.593	7.474	6.273	6.273	5.452	4.730	5.289	4.469	1.255	2.764	4.828
	T3	5.333	4.444	3.565	5.359	4.370	4.792	4.583	4.881	5.207	3.759	4.667	0.81	4.314
Total		***17.006***	***11.6***	***10.608***	***17.963***	***18.011***	***15.965***	***13.909***	***17.2***	***16.849***	***11.703***	***7.922***	***5.99***	***4.576***
							By- Product							
	T1	12.923	6.011	4.901	10.26	14.737	9.800	9.691	15.178	11.294	6.844	8.04	7.863	9.796
	T2	10.423	8.4	9.187	14.947	12.545	12.250	13.63	9.46	8.25	8.571	2.929	6.654	9.771
	T3	10.666	8.889	7.130	10.719	8.740	9.583	11.458	9.763	9.677	7.366	8.125	1.503	8.635
Total		***34.012***	***23.3***	***21.218***	***35.926***	***36.022***	***31.633***	***34.779***	***34.401***	***29.221***	***22.781***	***19.098***	***16.02***	***9.400***

No. of variety 2 (1 local, 1 improved)
No. of treatments 3 dates of planting

- 27 September
- 12 October
- 27 November

No. of replications 12 farmer fields
Average plot size 1839 m^2

2.2 East Central Zone

This zone consists of Kabul, Logar, Paktika, Wardak, Parwan, Kapisa, Wardak, Bamyan and Ghazni provinces. The elevation range of this zone is (1800-2900 masl). Annual maximum mean temperature is 24.6°C and the annual minimum mean temperature is – 5.9°C. Average precipitation of this zone is 292 mm annually. The first frost usually occurs on 12 October and the last frost occurs on 6 April with a total of 189 frost-free days. In Bamyan the first frost occurs on September 15 and the last day of frost is 15 May with a total of 135 frost-free days. The total cultivable land is 596,035 ha of this 533,004 ha is irrigated, 18,324 ha is rainfed and 44,707 ha is barren. The major crops of the area are cereals, vegetables and fruits.

3 Project Locations

3.1 Alingar IAD Project

Laghman IAD Project is located in Salab village, Alingar District approximately 30 km north-east of Mehterlam, the capital of Laghman province. The villages of Salab are located about 1250 masl in a very narrow sub-valley of the Kachor valley running from west to east towards the Alingar River.

Although there is no reliable climatological data available for the project area, it can be defined as semi-arid and comparable to the climate of the Eastern Zone, Jalalabad (with winter starting earlier and the summer season setting in later). The climate in Jalalabad is characterized by a dry summer season, with low rainfall (12 mm from June to Sep.) and high temperature (40°C), rainfall being concentrated in the months of December to May. From December until February the precipitation might fall in the form of snow on the top of the ridges, but does not last. The annual rainfall in Jalalabad is 171 mm (precipitation in Salab might be slightly higher).

The major crops in this valley are wheat, maize, vegetable and clover in small plots. Wheat is clearly the most common grown crop as all the farmers most important crop-grown as a food crop during the summer period.

3.2 Jaji IAD Project

Jaji Project area is located in the Eastern Agroecological Zone. The project area is located at a high altitude of approximately 2280 masl on the foothills of Spinghar mountain range which snow covered tops dominated the horizon to the north. The fields are situated on the foothills with slopes of 10% and are nicely terraced. The average annual rainfall in the project area is estimated at 350 mm. The rainfall is concentrated from December to May while the dry hot summer is interrupted by wet spells due to the monsoon. In the months December to February, precipitation falls as snow. The major crops grown in the project area are potato, wheat, forage crop (vetch, clover, alfalfa), and barley.

Table 10 Average Yield t/ha, Wheat Date of Planting OFT, Aqasi Village/Khwaja Omari 1998/99

Variety	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
		Grain						By Product					
Local	T1	3.654	3.642	3.245	4.349	14.890	3.723	7.308	9.104	8.245	8.699	33.36	8.339
	T2	4.741	2.935	4.106	3.488	15.270	3.818	9.481	7.337	10.264	6.977	34.06	8.515
	T3	4.480	2.444	4.435	3.430	14.789	3.697	8.960	6.111	11.087	6.859	33.02	8.254
Total		***12.9***	***9.02***	***12***	***11.3***	***44.949***	***3.746***	***25.7***	***23***	***29.596***	***22.54***	***100***	***8.369***
Pamir-94	T1	6.462	3.006	2.450	5.130	17.048	4.262	12.923	6.011	4.901	10.26	34.1	8.524
	T2	5.211	4.150	4.593	7.474	21.428	5.357	10.423	8.4	9.187	14.95	42.96	10.739
	T3	5.333	4.444	3.565	5.359	18.701	4.675	10.666	8.889	7.130	10.72	37.4	9.351
Total		***17***	***11.6***	***11***	***18***	***57.177***	***4.765***	***34***	***23***	***21.218***	***35.93***	***114***	***9.538***

No. of variety — 2 (1 local, 1 improved)
No. of treatments — 3 dates of planting

- 27 September
- 12 October
- 27 November

No. of replications — 3 farmer field
Average plot size — 1358 m^2

Table 11 Average Yield t/ha, Wheat Date of Planting OFT, Benisang Village/Khwaja Omari 1998/99

Variety	*Treatments*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
Local	T1	5.234	6.55	7.74	4.545	24.069	6.017	13.085	16.38	15.48	11.363	56.3	14.076
	T2	5.511	4.842	6.802	5.142	22.297	5.574	13.777	12.1	13.605	12.855	52.34	13.085
	T3	3.789	5.917	5.208	4.408	19.322	4.831	9.472	14.79	10.417	11.019	45.7	11.425
Total		***14.5***	***17.3***	***20***	***14.1***	***65.688***	***5.474***	***36.3***	***43***	***39.502***	***35.24***	***154***	***5.554***
Pamir-94	T1	7.368	4.9	3.874	7.589	23.731	5.933	14.734	9.8	9.691	15.18	49.4	12.351
	T2	6.273	6.273	5.452	4.73	22.728	5.682	12.545	12.25	13.63	9.46	47.89	11.972
	T3	4.37	4.792	4.583	4.882	18.627	4.657	8.74	9.583	11.458	9.76	39.54	9.886
Total		***18***	***16***	***14***	***17.2***	***65.086***	***5.424***	***36***	***32***	***34.779***	***34.4***	***137***	***11.108***

No. of variety — 2 (1 local, 1 improved)

No. of treatments — 3 dates of planting

- 27 September
- 12 October
- 27 November

No. of replications — 3 farmer fields

Average plot size — 2134 m²

Table 12 Average Yield t/ha, Wheat Date of Planting OFT, Noburja Village/Khwaja Omari 1998/99

Variety	*Treatments*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
Local	T1	5.294	3.262	3.887	3.555	15.998	4.000	12.353	6.924	9.420	8.397	37.09	9.274
	T2	4.745	4.201	3.229	3.313	15.488	3.872	11.062	9.243	8.07	7.087	35.46	8.866
	T3	4.071	3.311	3.241	1.751	12.374	3.094	7.561	8.400	8.102	3.253	27.32	6.829
Total		***14.1***	***10.8***	***10***	***8.62***	***43.86***	***3.655***	***31***	***25***	***25.592***	***18.74***	***100***	***8.323***
Pamir-94	T1	6.353	3.475	2.000	2.416	14.244	3.561	11.294	6.844	8.04	7.863	34.04	8.510
	T2	5.289	4.469	1.255	2.764	13.777	3.444	8.25	8.571	2.929	6.654	26.4	6.601
	T3	5.207	3.759	4.667	0.81	14.443	3.611	9.677	7.366	8.125	1.50	26.67	6.668
Total		***16.8***	***11.7***	***7.9***	***5.99***	***42.464***	***3.539***	***29.2***	***23***	***19.094***	***16.02***	***87***	***7.260***

No. of variety — 2 (1 local, 1 improved)

No. of treatments — 3 dates of planting

- 27 September
- 12 October
- 27 November

No. of replications — 3 farmer fields

Average plot size — 2025 m²

13 Annex II

Wheat Seed Rate On-Farm Trials
1998/1999
(Tables 13-17)

Table 13 Average Yield t/ha. Wheat Seed rate OFT, Khwaja Omari 1998/99

Variety	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*RV*	*RVI*	*RVII*	*RVIII*	*RIX*	*RX*	*RXI*	*RXII*	*Overall*
							Grain							Mean
Pamir-94	T1	3.972	4.202	2.261	4.911	6.135	6.252	5.248	4.517	7.663	5.873	8.457	7.269	5.563
	T2	3.636	3.962	3.355	3.214	5.953	3.875	5.222	6.092	8.589	6.158	9.015	7.466	5.545
Total		***7.6***	***8.2***	***5.6***	***8.1***	***12***	***10***	***10***	***11***	***16***	***12***	***17***	***15***	***5.554***
							By- Product							
	T1	7.945	8.405	4.522	9.822	12.269	12.503	10.496	9.034	15.325	11.746	16.92	14.539	11.127
	T2	7.273	7.925	6.71	6.429	11.907	7.749	10.443	12.184	17.178	12.316	18.03	14.931	11.090
Total		***15.0***	***16.0***	***11.0***	***16.0***	***24.0***	***20.0***	***21.0***	***21.0***	***33.0***	***24.0***	***35.0***	***29.0***	***11.11***

Treatments 2 rates of seed

- 42 kg/Jerib
- 56 kg/Jerib

Variety Pamir-94
Replication 12 farmer fields
Average plot size 1518 m^2

Table 14 Average Yield t/ha Wheat Seed rate OFT, Deh Nehal/Khwaja Omari 1998/99

Variety	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
		Grain						By product					
Pamir-94	T1	3.927	4.202	2.261	4.911	15.301	3.825	7.945	8.405	4.522	9.822	30.694	7.674
	T2	3.636	3.962	3.355	3.214	14.167	3.542	7.273	7.925	6.71	6.429	28.337	7.084
Total		***7.6***	***8.2***	***5.6***	***8.1***	***29***		***15***	***16***	***11***	***16***	***59.031***	

Variety Pamir-94
Treatments 2 rates of seed

- 42 kg/Jerib
- 56 kg/Jerib

Replication 4 farmer field
Average plot size 1294 m^2

Table 15 Average Yield t/ha Seed rate OFT, Deh Dawlat/Khwaja Omari 1998/99

Variety	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
		Grain						By product					
Pamir-94	T1	6.135	6.252	5.248	4.517	22.152	5.538	12.269	12.503	10.496	9.034	44.302	11.076
	T2	5.953	3.875	5.222	6.092	21.142	5.286	11.907	7.749	10.443	12.184	42.283	10.571
Total		***12***	***10***	***10***	***11***	***43***		***24***	***20***	***21***	***21***	***86.585***	

Variety Pamir-94
Treatments 2 rates of seed

- 42 kg/Jerib
- 56 kg/Jerib

Replication 4 farmer fields
Average plot size 1757 m^2

Table 16 Average Yield t/ha Seed rate OFT, Chel Gunbad/Khwaja Omari 1998/99

Variety	*Treat.*	*R.I*	*R.II*	*R.III*	*R.IV*	*Total*	*Mean*	*R.I*	*R.II*	*R.III*	*R.IV*	*Total*	*Mean*
		Grain						By product					
Pamir-94	T1	7.663	5.873	8.457	7.269	29.262	7.316	15.326	11.746	16.92	14.539	58.531	14.633
	T2	8.589	6.158	9.015	7.466	31.228	7.807	17.178	12.316	18.03	14.931	62.455	15.614
Total		***16***	***12***	***17***	***15***	***60***	***15***	***33***	***24***	***35***	***29***	***120.986***	***30.2***

Variety Pamir-94
Treatments 2 rates of seed

- 42 kg/Jerib
- 56 kg/Jerib

Replication 4 farmer field
Plot size 1504 m²

Table 17 Average Yield t/ha, Wheat seed rate OFT, Sargal/Jaji 1998/99

Treat.	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
			Main			
T1	3.501	2.315	3.512	4.43	13.8	3.439
T2	3.842	2.071	4.116	3.98	14	3.502
			By-product			
T1	5.66	3.748	6.028	7.16	22.6	5.650
T2	6.215	3.365	7.065	6.44	23.1	5.772

Variety Pamir-94
Treatments 2 rates of seed

- 35 kg/Jerib
- 44 kg/Jerib

Replication 4 farmer field
Plot size 1396 m^2

14 Annex – III

Wheat Irrigation On-Farm Trial
1997/98 & 1998/99
(Tables 18 – 19)

3.3 Khwaja Omari IAD Project

Khwaja Omari is located north of the province center Ghazni and is therefore located within the East Center agroecological Zone. The project area is a valley, bound in the west by a pronounced mountain range (3000 masl), in the north-east by Kohe Lokhak (2680 masl) and in the south east by Kohe Rawza (2578) masl). The area between Kohe Lokhak and Kohe Rawza is a plateau at 2450 masl. The valley width varies from 8 km in the north and 2180 masl in the south. Based on the modified geographic zones system the project area lies within the Southern Mountains and foothills characterized by a range of mean annual precipitation from 100-300 mm in the Ghazni Rod. As the project area lays about 200 – 500 meters higher than Ghazni Center minimum temperatures are lower during the winter and the duration of frost tends to be longer (at least four frost months).

4 Materials And Methods

4.1 OFT farmer selection process

- Contact the VO and explain our intentions and our criteria to them (75% of VO members should be present in the meeting)
- Receive the list of farmers suggested by the VO
- Make the necessary investigation about candidates against our criteria, with the VO
- Make a final selection with the VO.
- Explain our terms of agreement to selected farmers and the VO
- Sign terms of partnership with VO

4.2 Selection of OFT variables

- Explain the OFT concept to the VO (75% attendance)
- Listen to the farmers about their limiting factors through discussion with groups and individuals, direct observation and PRA
- Finalization of identification of limiting factors through VO (75% attendance)
- Design the trial through the VO
- 0Agree the timetable with the VO

4.3 Rules and regulation of OFT

- All OFT should last for 3 years
- Avoid pure variety trials
- Generally one variable per trial, maximum 2
- Same farmers up to the end of the trial (3 years)
- Replication minimum 4, maximum 6 but more are possible
- Replications should be in one village, if villages are neighboring (max. 1 km apart) and agricultural practices are similar then replications can be in more than one village
- OFT should be set up according to need, but in general one OFT per VO.
- Maximum can be two per year (should be different crops if in the same year)
- One farmer should not be involved in two OFTs
- Each farmer should be involved only in one replication of OFT
- Farmers involved in the replication of one OFT should be following the same agricultural practices (fertilizer use, irrigation, plowing etc.)

Table 18 Wheat Irrigation On-Farm Trial, Khost 1997/98

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*RIV*	*RV*	*RVI*	*Mean*
Kauz	T1	4.2	2.1	2.1	5.23	4.66	4.2	3.748
	T2	4.66	3.26	3.03	5.56	4.9	4.43	4.307

Variety Kauz
Treatments: 1. Irrigation scheduled by IAD

- 7 December 98, crown root formation
- 10 March 99, tillering stage
- 12 February 99, flowering/heading stage
- 25 february99, milking stage

2. Farmer practice

Replication 6 farmer field
Plot size 2000 m^2

Table 19 Wheat Irrigation On-Farm Trial, Gardez 1998/99

Varieties	*Treat.*	*RI*	*RII*	*RIII*	*Total*	*Mean*
Pamir - 94	T1	1.5	3.7	3.4	8.6	2.9
	T2	2	4	4	10	3.3
Total		***3.5***	***7.7***	***7.4***	***18.6***	***3.1***

Variety Pamir-94

Treatments 1. Irrigation scheduled by IAD

- 6 May 98, crown root formation
- 29 May 99, tillering stage
- 17 June 99, heading/flowering stage
- 04 July 99, milking stage

2. Farmer practice

Planting date 9-20 October 98, (the trial was planted in dry soil)
Replication 3 farmer fields
Plot size 2000 m^2

15 Annex-IV

Wheat Fertilizer On-Farm Trial
1998/99
(Tables 20 – 21)

Table 20 Wheat Fertilizer On-Farm Trial, Salab/Alingar 1998/99

Treat.	*RI*	*RII*	*R III*	*Mean*
		Main		
T1	5.19	4.60	5.4	5.06
T2	4.00	3.90	4.7	4.20
		By- product		
T1	8.20	7.30	7.70	7.73
T2	8.20	8.30	7.90	8.13

Variety Pamir-94
Treatments 2 rates of fertilizer

- urea 37.5 kg, DAP 28 kg per Jerib (IAD)
- urea 50 kg, DAP 50 kg per Jerib (farmer practice)

Replications 3 farmer fields
Plot size 575 m^2

Table 21 Wheat Fertilizer On-Farm Trial, Sargal/Jaji, 1998/99

Treat.	*RI*	*RII*	*RIII*	*RIV*	*Total*	*Mean*
		Main				
T1	4.054	2.589	2.737	0	9.38	3.127
T2	2.771	2.207	2.229	0	7.207	2.402
		By-product				
T1	4.859	3.104	5.199	0	13.162	4.387
T2	3.223	2.641	4.232	0	10.096	3.365

Variety Pamir-94
Treatments 2 rates of fertilizer

- urea 40 kg, DAP 25 kg per Jerib (IAD)
- urea 50 kg, DAP 0 kg per Jerib (farmer practice)

Replications 4 farmer fields
Plot size 1792 m^2

16 Annex – V

Wheat Weed Control On-Farm Trial
1998/99
(Table 22)

Table 22 Weed Control On-Farm Trial, Sargal/Jaji, 1998/99

Treat.	*RI*	*RII*	*R.III*	*R.IV*	*Total*	*Mean*
			Main			
T1	2.017	3.967	2.845	3.27	12.100	3.025
T2	1.916	3.96	2.848	3.24	11.967	2.992
			By-product			
T1	3.465	6.808	4.887	5.61	20.773	5.193
T2	3.285	6.797	4.888	5.57	20.536	5.134

Variety: Pamir-94

Treatments 2 methods of weed control

- 2-4-D herbicide @ 400 gram/Jerib, one spray before jointing stage (IAD)
- Mechanical weed control 2 times (farmer practice)

Replication 4 farmer fields

Plot size 2490 m^2

17 Annex – VI

Test of Variety
Laghman, Ghazni, Jaji
1998/99
Tables (23-25)

Table 23 Test of Variety, On-Farm Trial, Khwaja Omari 1998/99

Village name	*Name of variety*	*Date of harvest*	*Yield Ton/hec.*	
			Main	By product
Qalai Qurban	Gul-96	14-Jul-99	5.025	8.533
Benisang	Kauz	25-Jul-99	2.695	4.043

Variety	Date of planting	plot size (m^2)	Fertilizer (kg/Jb)		harvest date
			DAP	urea	
Gul-96	24 October 98	1200	25	42	14 July 99
Kauz	14 march 99	2716	25	42	25 July 99

Gul-96 variety irrigated five times and Kauz variety was irrigated six times.

On both varieties weeds were controlled chemically (2-4-D herbicide 400 grams/Jerib before jointing stage) and mechanically

Table 24 Test of Variety, On-Farm Trial, Salab/Alingar 1998/99

Varieties	*Items*	*Lower Salab* RI	*Lower Salab* RII	*Mean*	*Upper Salab* RI	*Mehterlam* RI
Takhar-96	Main	3.85	5.92	4.89	4.96	4.09
	By-product	6.00	8.08	7.04	9.00	7.85
Roshan-96	Main	5.52	5.08	5.30	5.00	5.37
	By-product	8.48	8.00	8.24	9.20	7.75
Kauz	Main	4.20	7.80	6.00	5.60	0.00
	By-product	5.60	6.40	6.00	11.00	0.00
Pamir-94	Main	5.60	0.00	5.60	0.00	0.00
	By-product	6.40	0.00	6.40	0.00	0.00

Variety	D. of planting	D.of harvest	Plot size (m^2)	Fertilizer (kg/Jerib) DAP	Fertilizer (kg/Jerib) urea
Roshan	12-20 November 98	15-28 May	600-1200	28	37.5
Takhar	7-26 November 98	15-29 May	550-1300	28	37.5
Kauz	12-15 November 98	26-27 May	400-1100	28	37.5
Pamir-94	23 November	03 June 99	620	28	37.5

Roshan-96, Takhar-96 and Kauz varieties were irrigated 5 times and Pamir-94 was irrigated 7 times.
Weeds were controlled mechanically by the farmers.

- During 3 years of the trial the farmers can change the land as long as it is similar to the original land

4.4 Inputs

- DACAAR provides fertilizer and seed for the farmers
- DACAAR provides any extra cost incurred for land preparation in OFT (e.g. date of planting)
- If a farmer used tractor last year then DACAAR can provide tractor
- If he used bullock or other means than he should continue with that system
- VO should agree to arrange at least one field day per season

5 Summary of OFTs

In 1997/98 DACAAR implemented 8 OFTs in two IAD Project areas (4 of which were cancelled) and two other areas. In 1998/99 as the IAD program developed the number of OFTs rose to 30 in three IAD Project areas, because of implementation problems and less interest shown by the farmers 4 OFTs were cancelled in 1998/99 because of implementation problems.

6 Date of Planting On farm Trials

DACAAR aims to increase production partially through a well thought out strategy of introduction of improved varieties as recommended by FAO. Therefore, in general DACAAR includes both improved and local varieties in all trials.

Method

Through the VO meetings the community identified wheat date of planting as limiting factors/variable. The planting dates were selected according to the farmers' usual practice and the judgment of the agronomist regarding a better date. In general the agronomists feel that the farmers plant too early.

Land preparation, fertilizer application, irrigation, weed control etc. through the growing season were carried out by the farmer. IAD agronomist/extension worker did not interfere in farmer practices. The agronomist at least once a week visited OFT. In the presence of farmer necessary data was recorded. Training was given to the farmer through the season.

In the phasing out projects there was no VO system. The farmers were selected by the agronomist for the OFTs. The agronomist and some experienced farmers identified limiting factors or variables. The farmers carried out all practices and through the season agronomist had tried to train the farmers who are involved in conducting OFTs.

6.1 Kandahar

An OFT (date of planting) only for one year in 1997/98 was conducted in Daman district of Kandahar. The farmers did not continue with the program because DACAAR withdrew after one year.

Table 25 Test of Variety, On-Farm Trial, Sargal/Jaji 1998/99

Varieties	Seed Rate kg/ha.	Fertilizer kg/ha.		No. of Irrigation	Yield ton/ha.	
		Urea	DAP		Main	By-Product
Rana	175	200	125	5	4.404	7.562
K2340/SK/MA/G2/3/ K340/FR14/14	175	200	125	5	3.548	6.745
F134-7/CRWS	175	200	125	5	3.179	5.453
VEE#7/OPATA	175	200	125	5	2.602	4.966
Gul-96	175	200	125	5	2.201	3.78
ENZA/KARTAYA	175	200	125	5	2.602	3.576

Variety	D.of planting	D. of harvest	Plot size (m^2)	Fertilizer (kg/Jb)	
				DAP	urea
Rana-96	18 November 98	14 July 99	931	25	40
Gul-96	20 November98	22 July99	159	25	40
ANZA/ KARTAYA	20 November 98	17 July 99	470	25	40
VEE#/7/	20 November 98	15 July 99	676	25	40
K2340/SK/MI/ GZ/3/K340…	22 November 98	20 July 99	513	25	40
F143-71/ CROWS	23 November 98	17 July 99	497	25	40

Weeds were controlled mechanically by the farmers and they irrigated their field 5 times during growing season.

18 References

1. Four year proposal, IAD Section DACAAR

2. IAD Project Area Description, IAD Section, DACAAR

3. IAD Field Report 1997/98, 1998/99, IAD Section, DACAAR

4. FAO Technical Report on cereals and food legume, varietal performance in Afghanistan, 1998. N. Wasimi

Four varieties comprising of Pamir-94, Kauz, (improved varieties), Mauri (local variety) and Mexipak, an old improved variety were, included in the trial. Mexipak has been planted in Afghanistan for the last more than 30 years and it has been degenerated and lost its resistant character to rust diseases through the years. The farmers continue to plant this variety in most parts of Afghanistan for its desirable grain color and baking quality.

Four dates of planting were considered with 15 days interval. The first date was 15 November, then 30 November, 15 December and the last date of planting was 30 December. One-year data of FAO trial for Kauz variety shows date of planting from 15 November to the end of December. This OFT was replicated as randomized design with 4 farmers in Daman district. Average plot size for each replication was 2023 m². Tractor was used for land preparation. Fertilizer rate was 50 kg urea, 25 kg DAP kg/Jerib and 27 kg /Jerib seed was used. Weed control and roguing on OFT plots were not been conducted.

Results and Discussion

During 1997/98-crop season due to high humidity, rust incidence was a serious problem all over Afghanistan. In this trial Mexipak variety produced 8%, 3%, 159% more yield than Pamir-94, Kauz and local varieties respectively. Kauz and Pamir-94 varieties each produced 140% and 152% more yield than local variety.

Though one-year data is not reliable, the results reveal optimum date for Pamir-94 and Kauz is 15 November, while for Mexipak 30 December and for Mauri 30 November. FAO recommends that in warmer areas Kauz should be planted between 1 November and end of December and 15 November as the optimal date for Kandahar. There is no FAO data for the other varieties (Table 1,Annex-1)

6.2 Gardez

The farmers were selected for OFT by the agronomist. Four dates of planting were selected for the OFT by well-experienced farmers and the agronomist. The first date of planting was 15 October, then 30 October, 1 November and the last date of planting was 30 November. There is no update recommendation regarding date of planting by FAO or other agencies for Gardez Province. The OFT was replicated with 3 farmers in randomized design in average plot size of 1667 m². Five varieties comprising 2 improved (Ataya-85 and Pamir-94) and 3 local varieties (Safedcha, Surkha, and Kundi) were included in the trial. Fertilizer rate 50-kg urea, 30 kg DAP and seed rate 45 kg/Jerib was used. Land preparation was done by tractor and the seed was planted in broadcast system. The farmers have conducted mechanical weed and roguing on their field.

Results and Discussion

Two years data shows clear variations among the treatments (dates of planting) as follows

During 1997/98, crop season because of rust incidence Pamir-94 rust resistant variety produced 21% high yield compare to Ataya-85 and 210% more yield than local varieties.

Since there was no rust problem in 1998/99, crop season, all varieties produced high yield.

Date of planting from 15-30 October produced high yield in all wheat varieties.

On 15 October the average yield over two year of three local varieties was 2.27 tons/ha. While the average yield of the same date in Ataya-85 was 4.07 tons/ha. and the average yield of Pamir-94 was 4.26 tons/ha. They produced 50% and 57% more yield than the local varieties. Across dates and varieties the optimum planting date (15 October) has shown an increase in yield ranging from 5-57%.

Pamir-94 produced the same amount of yield as Ataya-85 when there is no rust disease. Pamir-94 produces 21% more yield when there is rust incidence (Table 2-3, Annex-1)

6.3 Khost

Three dates of planting were chosen for the trial. First date of planting started from 1 November, then 15 November (farmers' practice) and the last date of planting was 1 December. FAO has not recommended date of planting for Khost. Two improved wheat varieties i.e. Kauz and Inqilab-91 were included in the trial and it was replicated with 6 farmers as randomized design in average plot size of 2000 m^2 in 1997/98, and 1998/99, crop seasons. Land was prepared by tractor. Fertilizer rate was DAP 25 kg, urea 37.5 kg and seed rate 35 kg/Jerib (farmer practice) was used. Local variety has not been included in the trial as check for comparison. Field of farmer number 6 in 1997/98 did not geminate well, and necessary data could not be recorded. Hail damage has been recorded 15-20% in 1997/98

Results and Discussion

Both improved varieties have produced high yield in 1997/98 and 1998/99, crop seasons. The average yield of the varieties over two years reveal that Kauz variety (4.6 tons/ha.) is high yielding compare to Inqilab-91 (4.1 tons/ha.) and produced 12% more yield.

Kauz variety in 2nd date of planting (15 November) in 1997/98 and 1998/99 produced 6%, 9% and 7%, 24% more grain yield against 1 November and 1 December (1st & 3rd dates) of planting respectively.

Inqilab-91 produced 2%, 18% high yield in I December (3rd date) in 1997/98 and 9%, 29% in 2nd date (15 November) in 1998/99-crop season.
This is the result of two years data and definite recommendation will be questionable. Two-year data shows the optimum date of planting for Kauze variety 15 November and for Inqilab-91 15 November to 1 December (Table 4-5, Annex-1)

6.4 Alingar

In 1997/98 growing season in Salab valley where IAD project has activities, initially wheat date of planting OFT was started. In this valley like many other places, date of

planting is a limiting factor and it had discussed in a VO meeting. Three date of planting were selected for the trial: 6 November, 6 October, 22 November (farmers' practice)

There is no recommended date of planting available for wheat crop for Laghman, but FAOs recommendation for Nangrahar for Kauz variety is from first November to middle of December. The OFT was replicated with 4 farmers as randomized design in average plot size of 2165 m².
Since the OFT planted only in two dates, therefore this trial was cancelled and a new OFT trial started in 1998/99

One-year data shows increase in average yield in 22 November (2nd date) by 13% in grain yield and 3% by-product. This date is a normal planting date in the valley. (Table 6, Annex-1)

In 1998 IAD program developed and established new VOs in upper Salab. Because of different climatic conditions and interest of new VOs considering IAD plan and programme two OFTs (date of planting) were designed for Upper and Lower Salab in the 1998/99 crop season and for each OFT, 3 dates of planting were selected.

Because of short planting season in Salab valley 10-day interval were considered.

First date of planting in Lower Salab started from 9 November, then 19 November (farmers practice) and the last date of planting was 29 November. Kauz improved variety was included in the trial and replicated with 3 farmers in randomized design in average plot size of 1143 m². Fertilizer rate was DAP 28 kg, urea 37.5 kg/Jerib and seed rate 28 kg/Jerib was used. Weeds mechanically controlled 5-7 times by the farmers and also they have rogued their plots at heading stage. Lodging is recorded 15% only in first date of planting (9 November) from the plot belongs to Omar Khan farmer. Powdery mildew disease has been recorded 5% in all plots and cover smut was a minor problem which was recorded 0.5% is in plots belong to Ghazi farmer.

For Upper Salab the first date of planting started from 2 November then 12 November (farmes practice) and the last date of planting was 22 November. Pamir-94 improved wheat variety was planted in 4 replications (12 farmers involved) as randomized design. Average plot size was 196 m². Fertilizer and seed rate was the same as lower Salab. Tractor was used for land preparation. Mechanical weed control was conducted 6-7 times and the farmers have rogued their plots at heading stage. Lodging was a problem and is recorded 10-50%

Results and Discussion

Lower Salab

First date of planting (9 November) produced 10%, 21% more grain yields than 19 November and 29 November planting dates, while by-product increased 25% 10% in the same date. Though there is no significant difference among the treatments, but clearly variation in the yield in different dates can be observed.

One-year average yield data of 1998/99, crop season in Lower Salab shows optimum planting date 9 November. In late planting than optimum date, grain yield will be decreased 55-106 kg/ha./day and by-product 17-68 kg/ha./day.

When the results of date of planting OFTs were discussed with the farmers they agreed that the earlier planting date had produced more yield, but still they are not sure that this is the final result of their experiment. Farmers showed interest in the result of the OFT and some of the farmers decided to plant their wheat in 1st week of November which produced more yield in the trial. It was also decided that to repeat this OFT for 2nd year to find out accurate result from the trial (Table 7, Annex-1)

Upper Salab

In 2nd date of planting (12 November) in Upper Salab, grain yield is increased 15%, 28% and by-product 6%, 13% than 2 November and 22 November planting dates. But the treatments are not significantly different. The average yield of 3 dates of planting shows planting wheat beyond or after the optimum date (12 November) decreases grain yield 67-115 kg/ha/day and by-product 48-103 kg/ha./day

When the results were discussed with the farmers they preferred to start wheat planting in second week of November, but they do not trust on one-year data. It was decided to repeat the experiment for 2nd year in order to get reliable results and find out proper date of planting. (Table 8, Annex-1)

6.5 Khwaja Omari

Two varieties comprising Pamir-94 (improved) and Kalak (local) were selected for this OFT. Pamir-94 wheat variety was released by FAO in 1994 and it is under multiplication with contract seed grower in IAD project area in Khwaja Omari district. This variety has wide range of adaptability, rust resistant and high yielding potential characters.

Kalak is a local variety, which has desirable grain color, good baking quality and high straw. When there is no rust disease incidence, it produces high yield, therefore the farmers in Khwaja Omari prefer to grow this variety.

Wheat date of planting OFT was planted in three different villages according to their locations e.g. lower, middle and upper parts of Khwaja Omari project area. The trial was replicated in randomized design with four farmers in each village. Average field size of the farmers was 1839 m^2.

For the date of planting On Farm Trial, three dates of planting was selected, the first date of planting was 27 September, then 12 October and the last date of planting was 27 October. These dates of planting were chosen on the basis of farmer's usual practices, which is 12 October (2nd date) and the agronomist judgment regarding best date. The agronomist considered 27 September to be the optimum date of planting for Khwaja Omari despite FAO's recommendation of the first half of October for Ghazni. This decision was taken on the basis of the relatively high altitude of Khwaja Omari compared with the FAO experimental area. For improved variety, fertilizer rate i.e. DAP, urea and

seed rate was used the same each 42 kg/Jerib. But for the local variety seed rate was 56 kg and DAP & urea fertilizer each 28 kg/Jerib.

Results and Discussion

Winterkill and bird damage on improved variety recorded 5-60%, but lodging is zero. Local variety has shown tolerant to winterkill and bird damage, but lodging is recorded 10-60%

Since there was no rust disease incidence during 1998/99, crop season, both improved and local varieties produced high yield. Over all means shows that Pamir-94 produced 7% more grain yields than local did, but by-product of local is 5% higher.

Improved variety in 2nd date of planting (12 October) produced 5% and 12% more grain yield, but by- product is increased by 0.3% & 13% in 1st date of planting (27 September).

Grain yield of local variety is increased 4%, 18% and by- product 4%, 20% in 1st date of planting or 27 September (Table 9, Annex-1)

Aqasi village (Upper Khwaja Omari)

These two varieties Pamir-94 and Kalak were replicated with 4 farmers in average plots of 1358 m^2. Because of no rust incidence during growing season both improved & local varieties (Pamir-94 and Kalak) produced high yield.

In 12 October date of planting (2nd date) improved variety produced 15%, 26% more grain yield and local variety in the same date of planting (12 October) 3% more grain yield compare to 27 September and 27 October planting (1st & 3rd dates).

In optimum date of planting (12 October), the average yield of the two-variety i.e. Pamir-94 is 5.357 tons/ha. while local variety produced 3.318 tons/ha. Pamir-94 in this date produced 1.539 tons/ha. or 27% more grain yield than local variety.

From the above analysis it reveals that the grain yield of Pamir-94 improved variety decrease 75 kg/ha./day in early planting and 47 kg/ha/day in late planting than optimum date (12 October). And the yield of local variety decreases by 6 kg/ha/day in early planting and 8 kg/ha./day in late planting than the optimum date or 12 October.

The results of date of planting OFTs were discussed with farmers in VO meetings, individual and group discussions. The farmers interested in the results of the trial and most of them decided to follow the results of the OFT which was conducted by the farmers in collaboration with DACAAR. It was also decided to repeat the trial for two more years in order to find out accurate and proper date of planting for wheat in the area (Table 10, Annex-1)

DACAAR
Integrated Agriculture
Development Section

Wheat On Farm Trial 1997/98 & 1998/99





By: Abdul Fatah

28/01/00

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Preface

Helping our vulnerable and resource poor farmers, due to circumstances in the country, requires a sound strategy. To develop such a strategy one should identify the limiting factors in our present day farmers' agricultural practices. Involving and putting the farmers, having experience and local knowledge, first or at an equivalent level as the agronomist, is very essential in this process. We should have a strong belief in the resource poor farmers' innovations as well as keep in mind that the ultimate users are the farmers. Therefore, we should help them believe and make use the maximum benefit out of the developed system and farmers' based and adaptive experimentation and research.

In other words, we should empower the poor farmers by creating a situation for them to critically think about their problems and the relevant solutions for the problems in their agriculture. It is proved beyond any doubt, around the globe, that the resource poor farmers have the ability to engage in experimentation, and to classify, choose, improvise, and adapt.

Realizing and having this in mind, DACAAR has embarked, since 1997, on interventions in Integrated Agriculture Development, having adaptive and farmer-based research or On-Farm Trials (OFTs) as one of its core activities in agriculture development in different parts of Afghanistan.

However, it should be mentioned that we are giving value to, utilizing the results of and looking forward to having and increasing co-operation with those institutions, FAO and others, who are conducting basic and scientific, On-Station research, carried out in controlled situations totally by scientists.

So far we have achieved good results and hope that we can make a model strategy replicable elsewhere by communities, NGOs and the Authorities.

I want to thank and congratulate our partner communities, farmers and all of my fellow field colleagues, who trusted each other, took the risks to experiment, tried to do things differently and accepted new ideas and challenges, for all this success. I am delighted to have an evidence on hand showing that the approach of putting the farmers' first is working.

The present analytical paper prepared by Mr. Abdul Fatah, the Deputy Section Head of IAD East, who has had a valuable contribution to the development and implementation of the programme, is a valuable and practical document for those who want to engage in participatory development interventions in Afghanistan and elsewhere. I want to congratulate him and wish him more success to serve his people.

Regards,

Engr. Mohammad Arif, Head of Integrated Agriculture Development Section
DACAAR.